Water Rights and Allocation

A subsection of the Iowa Water Plan - 2010

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Water Rights and Allocation Planning - 2010

Introduction

As part of the Iowa Department of Natural Resource's (IDNR) commitment to improving the management of both the quantity and quality of water resources, a committee was formed to assess the current policies and practices regarding water rights and allocation and to make recommendations that would assist the state in moving toward a sustainable future. While the impacts of recent flood events are still being felt in Iowa, one only has to go back to 1988, when then Governor Terry Branstad declared a statewide drought emergency, to remember that water shortages can also have severe impacts on Iowans. Water allocation concerns have been raised again in the past few years as increases in the demand for water are projected due to ethanol production, geothermal heating-cooling, and potential irrigation expansion. In 2007, the Iowa General Assembly approved an appropriation "*for regulating water quantity from surface and subsurface sources by providing for the allocation and management of water resources, and the preclusion of conflicts among users of water resources*[.]" To address this legislative mandate, the IDNR issued a planning document entitled "Strategy for the Management of Iowa's Water Resources." Objective 3 in the Strategy is *'Make necessary policy recommendations for the sustainable use of Iowa's water resources.'* Given this objective, the committee made 11 recommendations in the hopes of preventing as many future problems as possible for the regulated community, the IDNR, and all water users.

Committee members

The recommendations discussed in detail in this document are the results of internal committee meetings that took place in 2009 and early 2010 that included the following individuals:

Bernie Hoyer
Michael Anderson
Dennis Alt
Julie Sievers
Robert Libra
Mary Skopec
Randy Clark
Gregory Gelwicks
Robert Drustrup

External experts were also consulted, including the following:

Rob Middlemis-Brown, Unites States Geological Survey
Bill Simpkins, Iowa State University
Randy Beavers, Des Moines Water Works
Rick Cruise and Hillary Olson, ISU Water Center
Susan Heathcote, Iowa Environmental Council
Greg Brennan, H.R. Green
Anita Maher-Lewis, Consultant
Gary Shawver, Shawver Well Company
Tom Madden, Yaggy Colby Association
Marty Adkins, Natural Resources Conservation Service
Shane Stewart, Veolia Water, Storm Lake
Stan DeRoo, Cherokee Rural Water

Summary of Recommendations

Many of the recommendations are intended to establish clear, unambiguous priorities and policy, where existing rules were found lacking or where current practices have never been officially codified. The committee was also tasked with identifying areas where further research and/or stakeholder participation was necessary for achieving Iowa's water resource goals. The committee's final recommendations are summarized here:

1) Maintain the IDNR's authority and principles of water management established by the current Code of Iowa.
2) Add a definition of sustainability to the Iowa Administrative Code (567 Iowa Administrative Code (IAC) 50.2) as a guiding principle of resource management.
3) Establish rules that define water allocation priorities to guide the allocation process patterned after the existing drought rules.
4) Change emergency shortage priorities listed in 567 IAC 52.10(3) to potentially exclude water conveyed across state boundaries, and to include the use of water for open loop (geothermal) heating and cooling and for the irrigation of any specialty crop including tee and green areas of golf courses.
5) Encourage local response to water shortages by requiring public water supplies to include provisions for restricting consumptive water use in their emergency conservation plans to be implemented during transient drought and water shortage conditions.
6) Promote water conservation. The committee recognized that the need for formalized water allocation can be minimized by increasing voluntary long-term water conservation which will require active engagement of a wide variety of partners.
7) Improve the effectiveness of "Protected Flow" management by convening a scientific panel to assess statistical methods of evaluating flows, review flow thresholds given recent biological research, consider expanding flow thresholds to additional water resources, draft potential rule amendments, and make recommendations for implementing enforcement.
8) Explore the use of "Protected Water Source" designations to better protect resources such as springs, fens, coldwater streams, wetlands or other water bodies that could be threatened by nearby water development.
9) Draft changes to 567 IAC Chapter 52 so that all open-loop geothermal heating-cooling systems requiring permits will re-inject, unless it is determined by the IDNR that sustainability of the resource is protected with the use of a discharging open-loop system.
10) Develop an internal committee to consider to the issue of injecting waters into aquifers for various purposes and to develop coherent policy.
11) Further examine issues of interbasin transfers and interstate transfers and formulate policy. Iowa needs to define the State's interests and beneficial uses for Missouri River waters.

More extensive discussions and rationale behind these recommendations are included in the following pages. Questions may be directed to Michael Anderson at phone number 515-725-0336 or via email at michael.anderson@iowa.dnr.gov.

Recommendation 1: Maintain IDNR's Current Authority

The committee recommends maintaining IDNR's authority and principles of water management established by the current Code of Iowa.

The Code of Iowa gives the IDNR the authority and primary responsibility for water management and protection in Iowa. Authority for water management by IDNR is set forth in Iowa Code §455A.2:

> *A department of natural resources is created, which has the primary responsibility for state parks and forest, protecting the environment, and managing energy, fish, wildlife, and land and water resources in this state.*

State water management authority and the principles for managing water resources are provided in Iowa Code §455B.262 along with other IDNR responsibilities:

> *2. The general welfare of the people of the state requires that the water resources of the state be put to beneficial use which includes ensuring that the waste or unreasonable use, or unreasonable methods of use of water be prevented, and that the conservation and protection of water resources be required with the view to their reasonable and beneficial use in the interest of the people, and that the public and private funds for the promotion and expansion of the beneficial use of water resources be invested to the end that the best interests and welfare of the people are served.*
>
> *3. Water occurring in a basin or watercourse, or other body of water of the state, is public water and public wealth of the people of the state and subject to use in accordance with this chapter, and the control and development and use of water for all beneficial purposes is vested in the state, which shall take measures to ensure the conservation and protection of the water resources of the state. These measures shall include the protection of specific surface and groundwater sources as necessary to ensure long-term availability in terms of quantity and quality to preserve the public health and welfare.*

In order to protect Iowa's water resources for long-term availability as the Code requires, IDNR's Water Allocation Program is guided by the following principles:

1. All waters are considered **public wealth** and subject to the control by the state. Iowa Code §455B.262(3).
2. Public waters are to be put to (maximum) **beneficial use** in the interests of Iowans. Iowa Code §455B.262(2).
3. Waters are to be managed as **sustainable** resources thereby protecting beneficial uses into the future. Iowa Code §455B.262(3).

Recommendation 2: Define Sustainability

The committee recommends the addition of a definition of sustainability to the Iowa Administrative Code (567 IAC 50.2).

> *Sustainable (water supply) is the condition attained when the quantity and quality of available water resources are sufficient to meet current and future community, economic and ecosystem needs. It represents a long-term balance between resource conditions (supply) and beneficial uses (demand).*

'Sustainability' is a timely concept guiding natural resource management. Although there is no specific use of the word 'sustainability' in the Code, it seems to be defined operationally. In 455B.262(3), IDNR is instructed to *'…take measures…necessary to ensure long-term availability in terms of quantity and quality to preserve the public health and welfare.'* Similarly, the word is not used in the IDNR mission statement, but sustainability is implicit in the words *'…ensure a legacy for future generations.'* The word 'sustainability' is clearly prominent in the Strategy for Management of Iowa's Water Resources (12/1/07), and is a prominent concept in all policy discussions regarding the vital environmental issues of today.

'Sustainability' should be explicitly identified and defined in rules (567 IAC 50.2) to provide a context for users and a clear basis to guide DNR's water allocation program. This should include a general definition of sustainability. When more experience has been gained, rule changes might include specific pragmatic hydrogeologic criteria or programmatic rules. A sustainable water resource management program assures sufficient resources to meet current and future community, economic, and ecosystem needs. For surface waters, the purposes are to maintain flows in streams and water levels in other standing waters to protect beneficial uses. For groundwater, the purposes are to maintain water tables in unconfined aquifers and potentiometric levels in confined aquifers so that beneficial uses are protected and aquifers are not 'dewatered' causing harmful irreversible physical or chemical changes. Specific hydrogeologic criteria will be developed as information and analytical tools become adequate and may be stated in rule by area, aquifer, or both.

Sustainability involves both quantity and quality of water; it involves current and future users; and it involves both the supply of water and the demand for water. Water conservation and water quality improvement efforts will play a vital role in maintaining the quantity of usable water available for allocation. The theoretical concept of sustainability must be supported by careful process planning, programmatic integration, and scientific assessment of the resources and uses.

The concept of 'sustainability' is directly supported in Recommendation 3 which follows.

Recommendation 3: Establish Water Allocation Priorities

The committee recommends establishing rules that define water allocation priorities to guide the allocation process.

The following draft rule was developed to recognize unpermitted users, natural uses, and allow some flexibility for the program. It also follows the basics of the existing drought rules.

> 567 IAC 50.7: *In review of water permit applications, the following factors shall be considered in making water allocation decisions: the impact on unregulated, private water users; the impact on natural waters and ecological systems; consumptive and non-consumptive uses; prior allocations; water use efficiency; and water resource sustainability including climatic variability. Pre-existing beneficial uses will be protected in making allocation decisions during the period of an existing permit and may be protected beyond that period if the existing user can demonstrate that current best management practices of water conservation are being utilized. The Department will promote negotiations among competing water users to maximize beneficial uses considering available supply, demand, conservation, scheduling, location, and alternate water sources among competing uses and users. The following priorities are identified to guide allocation decisions among competing uses and users:*
>
> *a. Waters for human consumption and domestic livestock supplied by a private water supply as defined in section 455B.171*
> *b. Waters supporting threatened, endangered or protected species*
> *c. Waters supporting aquatic ecosystems such as streams, rivers, lakes, wetlands, springs, coldwater streams, and fens*
> *d. Waters for human consumption and sanitation supplied by rural water districts, municipal water systems, or other public water supplies as defined in section 455B.171*
> *e. Waters for livestock production using permitted water withdrawals (greater than 25,000 gallons per day)*
> *f. Waters for generation of electrical power for public consumption*
> *g. Waters for manufacturing or other industrial process*
> *h. Waters for irrigation of specialty crops including tee and green areas of golf courses*
> *i. Waters for geothermal heating and cooling and related uses*
> *j. Waters for irrigation of hay, corn, soybeans, oats, grain sorghum or wheat*
> *k. Waters for recreational or aesthetic purposes*
> *l. Waters conveyed across state boundaries for uses other than rural water or public water supplies.*

Upon evaluating Iowa's water allocation policies, the greatest need for water allocation policy change is the addition of rules that provide clear priorities among beneficial uses. These are for use in the allocation of water resources and the issuing of water withdrawal permits. In review of existing policy, no policies were identified that establish water

allocation priorities for the global allocation of resources. Protected flows and existing water allocation priorities are both associated with transient natural conditions of water shortages. Protected flows are limited to low flows, streams, consumptive users, and unconfined aquifers immediately adjacent to streams (i.e. within 0.25 miles). Existing allocation priorities were established in 1985 and are restricted to declared drought emergencies. Neither addresses overall allocation priorities that are most responsible for sustainable management of our water resources. The needed priorities would guide daily decisions regarding permit applications and maximizing benefits. The declared drought allocation priorities (Iowa Code §455B.266) have functioned as *de facto* permitting priorities. They guided water users as well as the IDNR, but they were not enacted to be such priorities. Iowa has the authority and responsibility to allocate water resources for long term sustainability and maximum beneficial use for its people. Defining water allocation priorities would facilitate common understanding and transparency among permit holders, permit seekers, and the IDNR.

Iowa has had remarkably few problems with water allocation. We are blessed with relatively consistent and plentiful resources. However, conflicts can be expected to arise more frequently as climatic variability, economic changes, and demographic changes increase and concentrate water needs. In an attempt to be proactive in reducing future issues, priorities among beneficial users are being proposed. These priorities reflect the priorities established in 1985 regarding drought conditions, but also include some factors not considered for emergency allocations, notably private supplies and natural ecological systems.

It is IDNR's responsibility to protect all water uses that are beneficial to the state, not just those governed by permits. Adequate water for beneficial uses such as private domestic water use and ecosystem function must be guaranteed. The consequences of diminished or contaminated private water supplies range from the cost of drilling new wells, switching to alternate sources or treatment, to lack of sanitary conditions and illness. Springs, wetlands, fens, and other waters provide unique or productive aquatic habitats, and there are several endangered species and species of greatest conservation need (SGCN) that depend on these habitats. The value of these ecosystems goes well beyond supporting wildlife by providing recreational and educational settings, preserving biodiversity, performing water quality improvement, and much more.

In addition to prioritizing uses to guide the decision-making process, the proposed language also addresses the process itself. Hydrological studies and collection and analysis of water-use data are fundamental to decision-making. The proposed language also emphasizes that determination of beneficial use will often require discussions among users and negotiations among technical and professional parties. It is in everyone's interest that reliable, adequate water resources are obtained and managed sustainably. Thus, alternative water sources, well spacing, well placement, pumping rates and timing, and other considerations may be negotiated amicably to achieve necessary and desirable water resources. Preserving negotiations among professionals with appropriate data needs to be protected.

There are a number of features of this proposal that deserve special mention.

- It functionally describes the process our water allocation program now uses, but it makes it clear to all.
- It supports and reinforces the concept of sustainable water resource management.
- It recognizes the importance of natural ecological systems and their water requirements.
- It recognizes the priority of unpermitted, private water supplies as important to the allocation permitting process.
- It protects existing permit holders throughout the duration of their permits.
- It recognizes preexisting users as having some priority in water allocation decisions if they are using best management water conservation practices; this encourages water conservation among users and promotes sustainability.
- The allocation priorities are proactive and may reduce problems in the future.

It is anticipated that there will be some questions raised about prioritizing private water supplies, endangered species and SGCN, and aquatic ecosystems ahead of public water supplies. The rationale is simple: public water supplies collect information about changes to their supply, and they have more resources for managing and providing alternatives for water development. IDNR has a responsibility to protect the natural resources, and this provision will enable our water allocation program the clear authority to do such in permitting water use. Superior rights have been given to unregulated domestic and livestock wells that existed prior to the mid-1950s, but this would extend to more recent private supplies. Conflicts are expected to be rare, but if they occur, the priorities provide a method for sorting them out. It is important to note that the existing allocation system functions acceptably, but the system simply does not have the authority of the Iowa Code or administrative rules behind it. Priorities are simply implied (from the drought priorities) and accepted by all parties. The proposed rule does not really change much; it simply explains the process, defines the priorities much as they currently are understood and administered, and provides the appropriate authority.

It is important to note that in the proposed rule, uses are not specified as permitted or unpermitted, but rather apply to all by use. In this regard, it recognizes the rights of unpermitted users as recommended in the 1978 State Water Plan. It also recognizes the rights of all users, but not by land ownership rights, prior use or prior allocation, but simply by use. Unpermitted, private wells for domestic consumption and sanitation have the highest priority; private wells for livestock production do not receive the same priority, although it is still high.

The 1978 Water Plan identified that the water rights of users not subject to the water permit system should be defined. Following is the conclusion drawn in that plan.

> *Conclusion: The common law of water rights is not uniform among the states. The Iowa Supreme court has adopted some of the more generally accepted principles and rejected or not addressed other principles. As a result there is little certainty as to exactly what the state's water rights law is for those water uses not subject to the water permit program. Often it is assumed the common law of other*

states would also be applied in Iowa. Frequently this is unwarranted or undesirable from an efficient water allocation policy perspective. Recommendation: The common law or water rights should be codified in conjunction with the existing water use permit system…principles should be explicitly incorporated or rejected in the course of codification. (1978 Water Plan, pages 192-193)

Looking at the issue 30 years later, it is not certain that this yet has been a serious problem. The principles of water resources (ownership by state, beneficial use, and sustainability) apply to all, regulated or not. Nevertheless, it should be noted that the proposed priorities do begin to define the rights of unpermitted water users in recognizing their priority to private supplies as part of the allocation program. This is not surprising as the IDNR's water allocation program has always recognized private supplies and considered them as having significance and importance in everyday practice. So, here too, the proposed rule simply helps to make the existing practice clearer to all.

Recommendation 4: Establish Emergency Shortage Priorities

The committee recommends that Iowa Code § 455B.266 and 567 IAC 52.10(3) be modified to reflect changes to the priority uses defined for emergency water shortage conditions as follows:

567—52.10(3) Priority allocation plan. *Notwithstanding a person's possession of a permit or the person's use of water being a nonregulated use, the department may suspend or restrict usage of water by category of use on a local or statewide basis in the following order:*

- ~~*a. Water conveyed across state boundaries.*~~
- *b. Water used primarily for recreational or aesthetic purposes.*
- *c. Uses of water for the irrigation of any general crop.*
- *d. Uses of water for open loop heating and cooling.*
- *e. Uses of water for the irrigation of any specialty crop including tee and green areas of golf courses.*
- *f. Uses of water for manufacturing or other industrial processes.*
- *g. Uses of water for generation of electrical power for public consumption.*
- *h. Uses of water for livestock production.*
- *i. Uses of water for human consumption and sanitation supplied by rural water districts, municipal water systems, or other public water supplies.*
- *j. Uses of water for human consumption and sanitation supplied by a private water supply.*

Priorities may be adjusted based on local permitted parties agreeing to meet drought needs through an alternative priority order with IDNR approval (see Recommendation 5). If stakeholders agree that it would be beneficial to give the IDNR the flexibility to change these priorities without legislative action as new uses arise, this prioritization could be eliminated from the Code but included in the Administrative Rules.

Rationale for removal of Item "a.": Generally, the courts have ruled that interference with interstate activities is generally not appropriate, although certain legal tests may allow some restrictions. In general, treating out of state water transfer water uses differently from in-state uses is inappropriate. Thus, if it appears that there is support for moving forward on the proposed Code changes, item a. should be looked at critically. The apparent intent is to protect all in state uses during droughts, and this probably would not work. However, if there are some other specific goals intended by this item, further legal review should be conducted with regard to those goals before anything final is proposed.

Discussion of Item "d.": Geothermal heating and cooling were not a recognized technology back in 1985, but it is a significant use of water resources today. IDNR recognizes that it is a beneficial use, but it must be sustainable. Open loop systems may have some role in transient water shortages. Unregulated use may lead to problems, and the use must be considered in relation to other beneficial uses during drought emergencies.

Discussion of Item "e.": Golf course greens and tee areas are expensive investments requiring extensive management. Considering the financial investment in them, it is appropriate to address these uses separately from water used solely for aesthetic purposes in times of drought.

Recommendation 5: Support Local Response to Water Shortages

The committee recommends changing 567 IAC Chapter 52 as follows in order to support local implementation and action related to transient drought and water shortage conditions:

> *567—52.9(3)c(2) Public water supplies. At a minimum, emergency conservation plans for public water supplies must include provisions for restricting outside, consumptive water use. Public water utilities, including city and rural water systems, are required to develop and enforce their own emergency conservation plans that best meet local needs. The utilities must administer these plans as needed for the public's benefit. The department may consider equivalent reductions of water use as meeting the purposes of this emergency conservation requirement.*

A water allocation priority system and emergency water conservation measures were proposed in the 1985 Water Plan and adopted into Iowa Code §455B.266 to address priority allocations of water during a time of shortage. After any serious water shortage condition exists, *'…the department shall investigate and, if appropriate, may implement the priority allocation plan provided in subsection 2. The department shall require existing permit holders to implement appropriate emergency conservation measures.'*

The water priority system adopted can only be activated through one of several declaration-of-drought mechanisms. Although there have been several droughts and other local transient water shortage episodes locally in Iowa since 1985, the law and associated rules have never been invoked. Local water utilities have acted to conserve water, citizens have voluntarily and of necessity conserved water, or special actions have been taken to provide water to those who needed it. In part, it is a bit cumbersome to invoke these rules requiring a Governor's declaration. Thus, without invoking these rules, per se, actions have been taken by communities to survive the transient water shortages based on the historic events. However, as water use escalates and climate fluctuates, the potential exists for future declaration of drought emergencies and, thus, implementation of the established priorities.

The current priority order for declared emergencies (as discussed in Recommendation #4) is suitable to be used by every system for initial planning purposes, but likely not specific enough to fit all individual circumstances. If local permitted entities can agree upon an alternative priority order, it is in everyone's interests to allow some flexibility.

As stated before, the Code and associated administrative rules have never been utilized for emergency water conservation. However, water utilities successfully have administered emergency drought restrictions during that time. Recommendation #5 supplements a portion of Recommendation 4. It is an attempt to recognize in rule form the important role that local water managers have in working with local communities to establish appropriate emergency measures to address local water shortages. This is, in fact, what has occurred in the past 30 years, and such local implementation seems the system best equipped to address most emergencies.

Recommendation 6: Promote Water Conservation

The committee recommends that IDNR engage its stakeholder partners to actively seek and promote methods of long-term water conservation as part of a sustainable society.

Along with review of emergency conservation procedures, IDNR's "Strategy for the Management of Iowa's Water Resources" (December 1, 2007) requires a review of 'routine' conservation measures. This is specifically identified under Objective 3: Make necessary policy recommendations for the sustainable use of Iowa's water resources. The Strategy links sustainability and long-term water conservation.

Existing language in the Iowa Administrative Code promotes water conservation:

> ***567—52.9 Water conservation.***
> ***52.9(1)*** *General. The purpose of water conservation requirements is to preserve the availability of water which is withdrawn for use […].*
> *Each permit granted after July 1, 1986, including any permit granted to a community public water supply, will include conditions requiring routine (day-to-*

day) conservation practices and requiring emergency conservation practices after notification by the department. Existing permits may be modified to include conservation conditions pursuant to 52.7(1)"d," if deemed necessary by the department.

Only general provisions for routine conservation will be included in a permit, unless water is to be withdrawn from a protected water source designated in 567 IAC Chapter 53 which has specific requirements for routine conservation. Permit conditions requiring routine conservation are primarily intended to raise awareness of water usage, develop preparedness for periods of water shortages, and minimize waste of water.

Two recommendations in this report promote water conservation. First, Recommendation #3 proposes that current permitted users can enhance the likelihood of favorable future water allocation decisions 'if the existing user can demonstrate that current best management practices of water conservation are being utilized.' This is a "carrot" to existing permitted water users. IDNR would welcome more ideas for such "carrots." Second, Recommendation #5 suggests that public water supplies are 'required to develop and enforce their own emergency conservation plan'. This may help encourage the development of long-term conservation plans which should also be developed. This recommendation stops short of requiring long-term conservation plans although IDNR has the power to do so. IDNR has been reluctant to require long-term conservation plans because IDNR lacks staff to adequately help permitted users develop their plans or even properly evaluate them. However, the development and implementation of such plans would go far towards the "carrot" identified above (Recommendation #3) demonstrating 'current best management practices of water conservation.'

Water conservation clearly fits into the broad concept of sustainability, a concept IDNR supports broadly, but also specifically here regarding water policy. Water conservation and energy are linked in the concept of sustainability. For example, pumping water takes energy; energy costs money; thus, saving water saves money. IDNR's pollution prevention program has consistently found that one of the most likely areas businesses can save money is related to water conservation. The Iowa Association of Municipal Utilities has promoted this concept with among its members. The Des Moines Water Works has promoted water conservation with its Smart Water Program. The water-energy link is strong and seems the most likely way to broadly promote water conservation.

In the water management business, there is the resource (supply) and there are users (demand). Both can be 'tweaked' to maximize beneficial use and that is the goal set out in law for Iowa's publicly owned/managed water resources. The State owns and regulates it for maximum beneficial use. Current water prices are generally considered low, making conservation more difficult to sell. Maximum beneficial use is achieved as demands go down. This promotes efficiency and should save users money. Reducing overall demand from best available conservation technologies among all beneficial user types is promoting sustainability of the resource and promotes greater potential beneficial use from the resource. In areas with water limitations or potential limitations, water conservation is a

method of extending water to more users and maximizes the benefits to the whole community.

In areas with water limitations, emphasizing water conservation can help maximize the available water resource to help a community grow and prosper. New water users can be brought in if the available resource is managed carefully and conserved. Local economic development potentials could be another powerful stimulus towards long-term water conservation where such chronic shortages may limit future community growth (see discussion of Protected Water Sources in Recommendation #8).

Partnering among various stakeholders for education programs that promote sustainability via water conservation/energy reduction/money-saving efforts may be a good way to promote water conservation statewide. Locally such efforts may also add to the economic success of the community in areas with water resource limitations. Partnering, developing common messages, and finding financial resources to promote educational efforts about water conservation would make any such programs more successful.

In the long run, educating the public on the energy and cost-savings of water conservation is probably the most powerful stimuli towards long-term water conservation.

Recommendation 7: Convene Panel to Review Protected Flow Information

The committee recommends that a scientific panel be convened to assess statistical methods of evaluating flows, review flow thresholds given recent biological research, consider expanding flow thresholds to additional water resources, draft potential rule amendments, and make recommendations for implementing enforcement.

The Iowa Administrative Code defines protected flows as follows:

> ***567—52.8 Designated protected flows of streams.***
> ***52.8(1) 1*** *Purpose. The protected flow is designed to protect and maintain adequate water supplies for ordinary household and livestock use; for fish and wildlife use; for recreational use; for in-stream wasteload assimilation and pollution control; for beneficial water use needs in the watershed; for preservation of aesthetic values; and for other uses of a public nature.*
> **52.8(2)** *Protected flow basis. The protected flow is based in part on statistical information contained in "Low-Flow Characteristics of Iowa Streams," (INRC Bulletin No.9 (1958)), "Low-Flow Characteristics of Iowa Streams through 1966," (INRC Bulletin No.10 (1970)), "Annual and Seasonal Low-Flow Characteristics of Iowa Streams," (INRC Bulletin No.13 (1976)), and "Statistical Summaries of Selected Iowa Streamflow Data Through September 1996, U.S. Geological Survey Open-File Report 98-176 (1998)."*
> [Specific discharge values are established for streams in IAC 567-52.8(3)]

Protected flows were established in 1956 to protect various beneficial uses from consumptive uses during times of low flows. The concept protects flows of interior streams with watersheds greater than 50 square miles when discharge goes below the seven-day, one-in-ten year (7Q10) low flow rate. It allows temporary suspension of withdrawals from the river or unconfined aquifers within 1/8 mile of the stream by consumptive uses (usually, irrigation) except community water supplies. Low-flow protection is vital to protecting stream aquatic life.

Although the protected flow concept is valuable and functions well, there are several concerns with it as it exists today.

- Established protected flows may no longer be scientifically defensible. Several decades' worth of additional gauging data is now available for analysis, and this data should be included in the analysis. This would improve the integrity of the system.
- Much has been learned about aquatic life in the past decades. This information should be analyzed and assessed to determine if more a more scientific biological basis can be used to establish flow requirements to protect our aquatic life.
- New methods for extrapolating flows or predicting flows from rainfall data might be investigated to improve enforcement of protected flows in both gauged streams and streams not gauged.
- Some special water resources may deserve protection. Springs, wetlands, fens and small coldwater streams are not currently protected by protected flows (or water levels for standing waters) as currently defined. These water resources deserve protection from potential permitted water withdrawals including bedrock groundwater withdrawals. Some modification of the protected water rules might be an effective means of protecting them.

Unlike the emergency priority allocation rules (567 IAC 52.10(3)), which have not been used to-date, protected flow is functionally enforced annually in Iowa. Drought conditions usually exist somewhere in Iowa each year, especially in late summer. When flows approach the defined protected flow discharges, official letters are sent to consumptive users warning them of potential permit suspensions, or ordering temporary permit suspensions to protect stream low flows. The concept is dependent on the existence of a stream gauging network which serves to produce the historic record utilized to statistically determine protected discharges and also monitor the current discharges that serve to enforce the protected flow values in the rules.

The system has functioned smoothly with few exceptions. Problems enforcing protected flows among irrigators are rare, in part because the potential enforcement is clearly understood as a permit requirement.

The integrity of the concept demands that protected flow values be updated with current gauging records. Stream runoff has changed and values deserve some recalculations. Current methods require gauging stations with 15-30 years of record, and there are stream reaches that would benefit from the addition of new stations. New methods may allow useful runoff estimations based on predictive models that could be used for reaches or

streams that are not gauged. Further, advances in the science of aquatic ecosystems require a look to see if another concept for protection might be afforded more successfully than is currently employed. There are professional groups now evaluating the biological need for flows and improved methods to establish so called E-flows (environmental flows).

Natural springs, wetlands, fens, coldwater streams and lakes might benefit from a concept similar to protected flows. Although the absolute mechanisms might be different they currently are not protected from potential reductions by other beneficial uses. Our committee has proposed specifically considering these resources in the initial allocation permitting process, but a 'protected flow' or 'protected level' might be another or an additional method. Similarly, our committee has proposed that protected water sources might also function to protect these natural waters. Thus, alternative methods, even redundant methods, may be considered. However, at the present time, they are unprotected in our water allocation program rules.

Recommendation 8: Explore the Concept of Protected Water Sources

Protected water sources (567 IAC Chapter 53) represent an available concept that may be used locally in areas where water resource sustainability requires especially careful management. The committee recommends further exploration of this concept to better protect resources such as springs, fens, coldwater streams, wetlands or other water bodies that could be threatened by nearby water development.

Following is the existing IAC reference to protected sources:

> ***567—53.3*** *(455B)* ***Purposes of designating a protected source.***
> *The general purpose of designating a specific water source as a protected source is to ensure long-term availability in terms of quantity and quality to preserve public health and welfare. Specific purposes include but are not limited to the following:*
> ***53.3(1)*** *To preserve the availability of the protected source for sustained beneficial use.*
> ***53.3(2)*** *To prevent or minimize the movement of groundwater contaminants.*
> ***53.3(3)*** *To maintain the surface water quality within a specific stream segment in order to meet state or federal standards, to preserve protected flows, or to maintain its availability for other beneficial use.*
> ***53.3(4)*** *To preserve the protected flows in a stream that is hydraulically connected to a protected aquifer.*
> *This rule is intended to implement Iowa Code section 455B.262*

Protected Water Sources were established in rules after the 1985 Water Plan. The rules in 567 IAC Chapter 53 require designation of a water resource of concern, designation of a specific geographic area, development of area-specific rules, and local hearings. Each

protected water source requires the development of specific rules for sustainable management. As such, the concept is somewhat labor intensive to establish, but could produce significant benefits where the effort demands it. It represents a section of rules that has only been utilized in the Cedar Rapids area to restrict groundwater use in the vicinity of a contaminated aquifer site. The potential exists to develop the concept as a tool anywhere that more intensive management of water resources is warranted and water allocations may be problematic. The concept allows for very specific rules to be developed which could require special information from potential users, facilitate negotiations to maximize beneficial uses among users, define aquifer alert actions, define aquifer specific withdrawal protections, impose water use restrictions, or require special conservation measures. Protected source water areas might be developed to require registration of users below the current 25,000 gallons per day (gpd) permit threshold, or even ban the development of private wells to reduce potential water conflicts. The rules could be used to require use of a particular model or could incorporate a model that defines sustainability for a particular area or aquifer. These areas could be required to mandate long-term water conservation efforts. In short, these areas could be used to do whatever needs to be done to manage the water resources for a sustainable future.

Perhaps the best example of this is the area around Storm Lake, which is at risk of having very limited water available in the future. In recent public presentations, IDNR has identified these as 'Yellow Flag Areas' in a proactive attempt to focus attention and energize planning efforts. This begins by defining sustainability and working with local residents and businesses to manage their resources. These 'Yellow Flag Areas' could be declared official 'Protected Source Areas.' As such, they would function as special, highly managed areas, governed by special rules within our water allocation program.

The concept might also be utilized to protect high value natural resources such as springs, fens, lakes or wetlands from quantity and/or quality issues. For example, the spring that feeds the hatchery at Manchester might be protected from groundwater withdrawals that reduce discharges at the hatchery if the withdrawals impacted the ability of the hatchery to perform its function. The limitation of this approach is that a "Protected Source Area" would need to be established prior to permitted withdrawal applications. This would require local communities and IDNR to identify resources they wish protected and begin the development of specific rules for the area. In this case, the concept might be used much like 'protected flow' protects streams.

Recommendation 9: Draft Regulation of Geothermal Heating-Cooling Systems

The committee recommends that changes to 567 - IAC Chapter 52 be drafted so that all open-loop geothermal heating-cooling systems requiring permits will re-inject, unless it is determined by the IDNR that sustainability of the resource is protected with the use of a discharging open-loop system.

Groundwater heating-cooling systems have emerged in the past decade as an important cost-effective energy-conserving technology. The technology uses the heat of the earth to both cool buildings in summer and heat them in winter. The additional cost of installing a new geothermal system can be recovered by savings in energy expenditures in as little as five years. Naturally, Iowan's are increasingly choosing these systems for homes, public facilities, and business. Global warming concerns also drive society towards these systems as heating and cooling represents the largest single sector of our energy usage. Geothermal heating-cooling is clearly a beneficial use of water.

There are two major types of these geothermal systems: open loop systems (including both surface discharge systems and reinjection systems); and closed loop systems (including both vertical and horizontal oriented systems). Closed-loop geothermal systems do not require a water-use permit because there is no withdrawal.

Open loop systems that discharge to surface waters (often referred to as pump-and-dump designs) draw groundwater for heating or cooling from an aquifer and then discharge the water after a single pass through a heat exchanger for either cooling or heating. Domestic use of these systems generally does not require a withdrawal permit since home systems typically use less than the 25,000 gallons per day required of permitted water users (most use approximately 15,000 gallons per day during the peak season). Business, industrial or institutional systems generally would require permitting because of their larger water use requirements.

Concern for these systems is generally directed at their consumptive nature. They take water from an aquifer and deliver it to surface water. The concern is that these systems may take water that is necessary for other uses and 'waste' it. Such an argument involves a value judgment and presupposes priorities among beneficial uses. Large institutional or business applications can utilize large amounts of water. Home systems generally seem benign, but where these systems might be concentrated such household systems in aggregate could constitute a potentially large, undocumented use of groundwater and make sustainable management of groundwater more difficult. Widespread adoption of household systems locally could constitute a significant drain on available resources for other users.

From a practical standpoint, open loop systems that discharge to surface water are most commonly located in areas with abundant, shallow groundwater resources. This is generally where aquifers are discharging to rivers and maintaining river base flow. Thus,

in these cases, the groundwater is rerouted through the heat exchanger system and discharged to the river through a pipe or stormwater sewer system rather than being discharged to the river through the steam bed. Potentially, these systems could also tap a deeper, high yielding aquifer.

While open loop systems are more cost-effective; such systems have significant potential impacts on water quantity. Water quality issues have also been raised with these systems because it is conceivable that contaminated groundwater could be discharged to surface waters.

Open loop systems that re-inject to the aquifer represent a variation on the open loop system. Again, the groundwater is used once through the heat exchanger, but in this instance the water is then re-injected into the original aquifer through a separate well. Again, such a system is usually located where significant groundwater is available at relatively shallow depths. It requires an aquifer with relatively high transmissivity (an open, porous, permeable system capable of moving large amounts of water) to enable injection to occur properly. The obvious advantage of this system is that it functionally takes no water from the aquifer, protecting the aquifer for other uses and protecting the sustainability of water resources in the area. There are concerns about injecting potential water additives used to protect the heat exchanger into the aquifer. Heat pollution is also a concern. One feature of these systems is that they can be built so that one can reverse the process and extract waste heat from the re-injected groundwater from the summer cooling to make the winter heating more effective.

Closed loop systems circulate fluid (water and additives) in below-ground pipes without discharging. They also come in two varieties: horizontal and vertical loop systems. The systems require no permits as there is no water withdrawn. They are not consumptive users of water. The ground cools the water in summer and heats the water in winter as the system circulates through pipes. Such systems can be developed with much less available groundwater and in areas where the available aquifers are deep and/or have low production potentials. These are the most expensive to install and operate. Concerns with these systems are related to leaks and groundwater contamination from additives, such as antifreeze. On the other hand, these systems benefit the environment by reducing greenhouse gas emissions from traditional fossil energy sources.

Choosing the most appropriate system depends on the hydrogeological setting, cost considerations, available area, and environmental concerns. It is difficult for IDNR to map and approve by rule the specific areas where each type of geothermal system is most appropriate or acceptable. This proposal should not be interpreted as ban on discharging open loop systems, but it would put the burden on applicants to provide information to inform sustainable water management and it would ensure that IDNR considers the available information about the aquifer and other users before issuing permits for these systems.

Recommendation 10: Evaluation of Issues Related to Water Injection and Storage

The committee recommends that IDNR develop an internal committee to consider to the issue of injecting waters into aquifers for various purposes and develop coherent policy.

Current rules do not allow the injection of any contaminant into Iowa's groundwaters other than heat, however, various rules are in place that allow other forms of injection such as aquifer storage and retrieval systems and agricultural drainage wells (for which there is a targeted closure program in place). As surface water rules tighten regarding discharges, and air quality rules begin to address greenhouse gases, storage or injection into the ground may become an increasingly attractive alternative to various enterprises. Business enterprises may think about injecting chlorides, carbon dioxide ($CO_{2)}$, or other waste chemicals in an attempt to avoid surface water discharge violations, greenhouse gas discharges, or other releases to water or air. Thus, it seems appropriate to rethink the concept of injecting anything into the ground and determining a coherent policy on where, or under what conditions, injection might be appropriate, if at all. Although disposal is prohibited, we do it and the pressure to do more of it seems inevitable. It is time to seriously address the questions of where, what, and under what conditions might we safely, sustainably, and beneficially store 'contaminants' in our aquifers.

The broadest rule prohibiting injection of pollutants is found in 567 IAC Chapter 62:

> ***567—62.9 Disposal of pollutants into wells.*** *Commencing September 1, 1977, there shall be no disposal of a pollutant other than heat into wells within Iowa. Any disposal of heat shall be sufficiently controlled to protect the public health and welfare and to prevent pollution of ground and surface water resources.*

Agricultural drainage wells which allow tile waters and their associated contaminants to flow into aquifers are allowed by rule as follows:

> ***567—51.8 Agricultural drainage wells.*** *All agricultural drainage wells must be registered by the owner with the department by September 30, 1988, on the form provided by the department. Registration of an agricultural drainage well is not considered a permit as required under rule 51.3(455B) or subrule 51.6(5).*

Aquifer storage and retrieval systems are authorized putting potable water into aquifers as follows:

> ***567-55.6(1)e. MCL exceedance limitation.*** *No permit shall allow injected water to contain contaminants in excess of the maximum contaminant levels (MCLs) established by the department in 567—Chapters 40 to 43. Chemicals associated with disinfection of the water may be injected into the aquifer up to the standards established under 567—Chapters 40 to 43 or as otherwise specified by the department.*

Back in 1986, the US EPA was interested in classifying aquifers to determine where injection might be done safely. The Groundwater Protection Strategy specifically avoided any such classification system because it was felt at the time that it would be inappropriate. Rethinking of the issue is in order, and drafting of a clear statement of what is permissible and not permissible in 567 IAC 62.9 should be considered.

Recommendation 11: Evaluation of Cross-boundary Issues

The committee recommends that IDNR further examine issues of interbasin transfers and interstate transfers and formulate policy. Iowa needs to define the State's interests and beneficial uses for Missouri River waters.

In the 1985 drought allocation rules, 'Water conveyed across state boundaries.' was identified as the first use to be cut off. Such a restriction may not be legal (interstate commerce), but the state might have some options to restrict waters moving from Iowa to adjacent states. It is not clear that such restrictions are even desirable or under what conditions or for what uses the state may wish to place restrictions on interstate transfers of water. For example, Iowa might wish to place restrictions on water moving to adjacent states for irrigation, but not for drinking water. Or, the state might want to place restrictions on groundwater, but not surface waters. Either way, the state should consider this issue and make recommendations. It is known that waters are moving across state lines from Iowa into Missouri, South Dakota and Minnesota. What would Iowa do if someone developed a plan to extract large amounts of Missouri River alluvial waters and use it in another state? The state needs to research if adjacent states have any restrictions and consider the implications of any such restrictions. It is reasonable to expect that the state may have more control over groundwater than surface waters.

Similarly, the state needs to consider if transfers from one watershed to another, or from one river basin to another, should be restricted. Does the state want to put any restrictions of waters moved from the Des Moines Basin to the Little Sioux Basin, for example? Would it make any difference if the water was intended for public water supplies or irrigation? Would it matter if the transfer was for irrigation purposes or power plant cooling? In the West, such transfers are made because of shortages in water especially with regard to urban development. It is not clear that this is a problem, but Iowa law does not address this issue. Two things need to be considered: desirable policy goals and legal issues. It is probably time for Iowa to begin formulating policy on both inter-basin and inter-state water movement. The issues are probably most pertinent along Iowa's western boundary.

The Missouri River is perhaps the location where all of these issues coalesce. The West needs water; Iowa is a relatively water-rich state with historically modest water needs. Our driest areas in Western Iowa are wetter than the wettest portion of Great Plains or Mountain Western states. As a result, our policies on water allocation are not well developed, our laws are relatively simple, and there is not much court case-law. The increase in extreme precipitation events (both low and high) and other climate-related

changes, combined with changing demographics, are likely to make these challenges more acute. Western states look longingly at water from the Missouri. This leads to issues common in the West, but foreign to Iowa: inter-basin water movement. In the 1970's, there was a proposal to move water from the Missouri River to mountain states for coal processing. New, similar proposals may arise in the future. The closest real examples of interbasin transfers are located in North Dakota. Two projects are scheduled to move water from the Missouri River to the Red River in order to meet increased community and irrigation water needs. These projects, combined, will take about 100,000 acre-ft (approximately 0.4%) of Missouri River flow. These projects have been approved or in the final approval stages with the Bureau of Reclamation. Would such losses impact Iowa's uses of Missouri River water? Would greater extractions from the Missouri impact Iowa's uses? We simply don't know because we have not defined them.

Missouri River waters are being diverted, yet Iowa has not been an active player in the discussions about water transfers nor very effective regarding other water management issues on the Missouri. We need to define our Missouri River water needs and the benefits we can derive from that system more fully. With the new Corps Missouri River Authorized Purposes Study being initiated October 1, 2009, this is an opportune time to begin. This five year study may lead to congressionally directed changes in the Flood Control Act of 1944 which has defined the primary uses of the Missouri River for the past 65 years.

IDNR has begun with making some preliminary legal research into interstate water law. That process needs to continue and policy options formulated for a public discussion of these issues.

Programmatic Update

These water rights and allocation recommendations are complimented by the IDNR's Geological and Water Survey's recent assessments of important groundwater resources including the Jordan and Dakota bedrock aquifers and the Nishnabotna alluvial aquifer. By improving our understanding of these resources, the IDNR will be better able to evaluate potential future scenarios such as changes in precipitation and recharge, localized effects of increased pumping rates due to new industry, or contamination.

Also, in 2008, IDNR's water allocation program was authorized by House File 2672 to begin collecting up to an additional $500,000 in fees each fiscal year, to pay for the program. Iowa Code §455B.265(6) requires the fees to be based on the IDNR's *"reasonable cost of reviewing applications, issuing permits, ensuring compliance with the terms of the permits, and resolving water interference complaints."* This funding will help support the IDNR's efforts to track water use, effectively manage permits, and continue serving the needs of Iowa's water users.